Behavioral Risk Factor Surveillance System

Contents

Vol. 2, No. 1 Spring 1995

The Centers for Disease Control and Prevention (CDC) provide funding and technical assistance to the Behavioral Risk Factor Surveillance System (BRFSS) which was introduced in New York State in 1983 and has been conducted annually since 1985. Standardized questions developed by CDC are administered via a telephone survey. This survey provides state-specific prevalence estimates of diseases and preventable behaviors attributable to early morbidity and mortality. These data are used to assess health-related behaviors, plan and promote health programs and support legislative decisions.

This report describes prevalence and trends in cardiovascular risk behaviors measured by the BRFSS including cigarette smoking, overweight, sedentary lifestyle, elevated blood cholesterol and high blood pressure.

The Behavioral Risk Factor Surveillance System - Summary Report is published quarterly. Issues will contain brief summaries on the risk factors included in each year's survey. Occasionally, issues will summarize special surveys, analysis of trends and more in-depth discussion of specific risk topics. Copies may be obtained by contacting:

New York State Department of Health
BRFSS Coordinator
Bureau of Adult and Gerontological Health
Empire State Plaza, Rm. 557, Corning Tower
Albany, NY 12237

or by phone:
(518) 474-0512

Behavioral Risk Factor Surveillance System

Trends in Cardiovascular Disease Risk Factors Among New York State Residents

Christopher Maylahn, MPH (Bureau of Adult and Gerontological Health)
and Elena Varavikova, MD, PhD (SUNY–School of Public Health)

Improving the cardiovascular health of our population is important in reducing morbidity and mortality associated with major cardiovascular diseases, as well as maintaining quality of life. Since the late 1960s, we have witnessed an impressive decline in cardiovascular disease mortality, especially stroke. A reduction in the prevalence of known risk factors for cardiovascular disease—such as smoking, elevated serum cholesterol and high blood pressure—may partially explain this decline. (1-3)

Cardiovascular disease risk is of special concern in New York State, since our state has consistently had very high cardiovascular mortality rates, especially for ischemic heart disease (the major contributor to cardiovascular disease). The crude and age-adjusted ischemic heart disease death rates for New York State have been the highest in the nation for more than a decade. (4) Within the state, the highest rates have occurred in New York City. However, New York State's high ranking for ischemic heart disease mortality is not solely due to the effect of mortality in New York City; the New York State region with the lowest rate in 1986 was surpassed in mortality by only eight states. (5)

There is evidence that the decline in ischemic heart disease mortality for the United States as a whole, as well as for New York State, has slowed over the last decade except in white males. (6) Because cardiovascular risk increases so dramatically with age, the aging of the population may actually result in an increase in the absolute number of those dying from heart attacks, strokes and other forms of cardiovascular disease. The medical costs associated with treating these patients as well as providing acute and long-term care—currently estimated at $135 billion nationally—will also rise.

Data were analyzed from the Behavioral Risk Factor Surveillance System (BRFSS) for the period 1985-1992 to identify the prevalence of major cardiovascular risk factors among New York adults and how New Yorkers compare with the rest of the nation; to identify population subgroups that reported higher risk factor prevalence; and to establish trends in risk factors, especially those addressed in *Healthy People 2000: Objectives for the Nation.* We hoped that this information would suggest opportunities for intervention to reduce cardiovascular disease risk among the general population and high risk groups.

Cigarette Smoking

Cigarette smoking is the single most important preventable cause of cardiovascular disease, responsible for more than 14,000 cardiovascular-related deaths in New York State each year. (7) Cigarette smoking increases the prevalence and extent of atherosclerosis in the aorta and coronary arteries, is a powerful risk factor for sudden cardiac death and is an independent risk factor for fatal and nonfatal heart attacks and strokes. Furthermore, smoking increases the likelihood of a second heart attack among those who have already had an attack and diminishes the probability of survival. (8)

Cigarette smoking among young people produces significant health problems, such as respiratory symptoms, decreased physical fitness, an unfavorable lipid profile and increases the risk of numerous adverse conditions in adulthood. Smoking prevalence among adolescents declined sharply in the 1970s, but the decline slowed significantly in the 1980s. Nearly all first use of tobacco occurs before high school graduation. A recent report of the United States Surgeon General entitled, *Preventing Tobacco Use Among Young People,* concludes that if adolescents can be kept tobacco-free, most will never start using tobacco. (9)

In 1992, the prevalence of smoking among New York adults was 22 percent, the same as the United States median. There were small differences among subgroups in the prevalence of smoking except

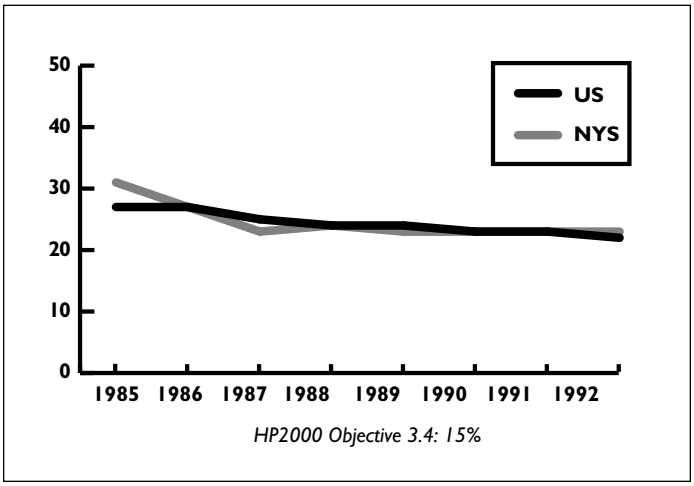

Figure 1. Percent of Adults Who Smoke Cigarettes 1985-1992

for Hispanic females, who reported a lower prevalence. Data from the New York sample of the Current Population Survey conducted in 1989 showed that smoking was significantly lower in Asians.

From 1985 to 1987, the proportion of New Yorkers who smoke dropped from 31 percent to 23 percent. From 1987 to 1992, the prevalence remained constant at 23 percent (Figure 1). Over the entire period, the decline was greater in blacks (14%) than in whites (9%), which is consistent with national trends. Since 1986, the BRFSS has found that the smoking prevalence in males has fallen by about one-third; for females, the prevalence has remained essentially unchanged.

Although the BRFSS does not include people under the age of 18, data are available from the New York State Youth Risk Behavior Survey to estimate the extent of the smoking problem among youth living outside of New York City. (10) Knowing smoking prevalence in the younger age groups is important in projecting future smoking trends, since half of all smokers begin smoking regularly before age 15. In 1991, 14 percent of adolescents (ages 14-18) smoked cigarettes. Although more males than females appear to have started smoking at an early age, a higher percentage of females smoked at the ages of 11 through 14.

Overweight

Overweight has serious adverse effects on health and longevity. The risks of overweight and, in its more extreme form, obesity are associated with elevated cholesterol, high blood pressure and non-insulin dependent diabetes. It may also be a risk factor in osteoarthritis of the weight-bearing joints. Overweight is an independent risk factor for cardiovascular disease.

The BRFSS used a method for classifying a respondent as overweight based on self-reported height and weight values. A person was considered overweight if the body mass index, defined as weight(kg)/height(m)^2, exceeds 27.8 for men or 27.3 for women. These values are derived from the distribution of weights recorded during the Second National Health and Nutrition Examination Survey and coincide with the 85th percentile.

In 1992, the prevalence of overweight in the New York adults aged 20 and over was 27 percent, with higher prevalence in men, in older age groups and in nonwhites. During the time period 1985-1992, the prevalence of overweight among New York State adults rose from 18 percent to 27 percent, a 9 percent increase over seven years (Figure 2).

Data collected from nationally representative surveys of United States adults during the period 1960 and 1980 indicated that the prevalence of overweight among whites in the United States increased by 3 percent in women and 6 percent in men. In blacks, however, the prevalence of overweight increased by 7 percent in females and 28 percent in men. (11)

In 1992, 37 percent of New York adults reported they were trying to lose weight (although only 25 percent were considered overweight). Of those who were trying to lose weight, 77 percent were eating fewer calories, while only 51 percent were increasing their physical activity levels.

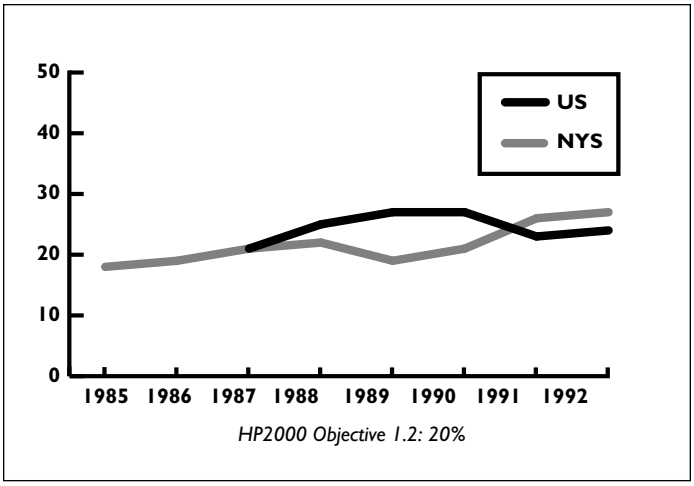

Figure 2. Percent of Adults Who are Overweight 1985-1992

Overweight children have a higher risk of adult obesity, which increases with the age of the child and the severity of the overweight. (12) Overweight children are also at greater risk for heart disease, diabetes, emotional stress, orthopedic disorders and respiratory problems. (13) A statewide survey of second and fifth grade children in New York State found an alarming percentage of children to be overweight. The prevalence of overweight was 35 percent for school children examined in New York City and 28 percent for children from the rest of the state, (14, 15) when overweight was defined as a body mass index greater than the 85th percentile of the age- and sex-specific values from the first National Health and Nutrition Examination Survey (NHANES I).

Sedentary Lifestyle

A sedentary lifestyle increases the risk of cardiovascular disease, diabetes, colon cancer and osteoporosis. (16, 17) Physical activity can reduce overweight, help control high blood pressure, elevated cholesterol and diabetes, and promote mental well-being which may lead to healthier behaviors. The greatest benefits of physical activity are achieved when the least active individuals become moderately active. (18) Even low- and moderate-intensity exercise, when carried out consistently, is associated with important cardiovascular benefits. The *Healthy People 2000: Objectives for the Nation* aim to reduce the proportion of the population age six and older who engage in no physical activity to no more than 15 percent. The BRFSS data provide estimates for adults 18 and older.

BRFSS respondents were asked if they participated in any leisure-time physical activities in the last month and to provide information

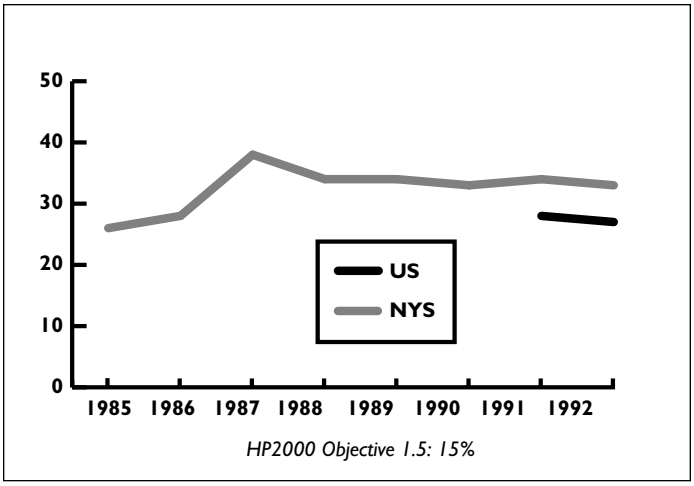

Figure 3. Percent of Adults Reporting No Leisure-Time Physical Activity, 1985-1992

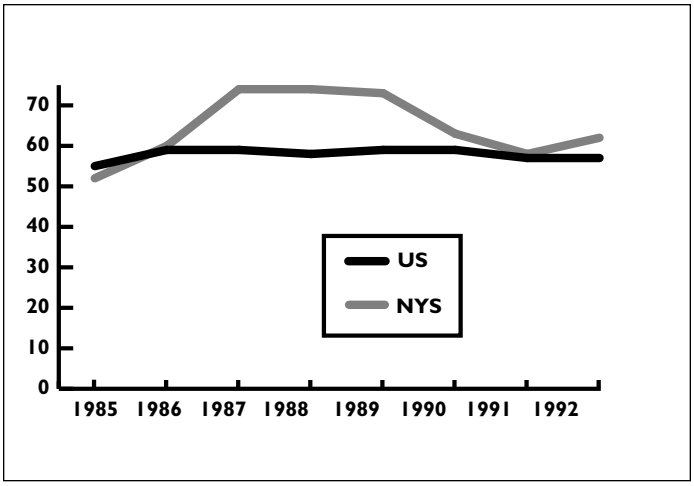

Figure 4. Percent of Adults Who Reported a Sedentary Lifestyle, 1985-1992

about the type, frequency and duration of these activities. In 1992, 33 percent of New Yorkers reported no leisure-time physical activity during the past month. An additional 29 percent engaged in irregular physical activity, that is, fewer than three times per week or less than 20 minutes per session. People were considered sedentary if they reported no leisure-time physical activity during the past month or if they engaged in irregular physical activity. A sedentary lifestyle was more prevalent in females, nonwhites and older age groups. Among those who specified the leisure-time physical activities in which they usually participated, walking was the most commonly mentioned. The proportion of respondents engaging in walking as their most significant leisure-time physical activity remained relatively constant at around 40 percent.

Between 1985 and 1992, the proportion of respondents reporting no leisure-time physical activity increased 7 percent, from 26 percent to 33 percent (Figure 3). The United States median values are available for 1991 and 1992, showing that the New York State proportions were higher both years. The proportion of respondents considered sedentary rose between 1985 and 1992 (from 52 percent to 62 percent), and has exceeded the U.S. median every year during this period except 1985 (Figure 4).

Elevated Blood Cholesterol

Elevated levels of cholesterol in the blood are associated with increased risk of cardiovascular disease, especially ischemic heart disease. Most people can lower their blood cholesterol through a treatment regimen of cholesterol-lowering drugs and a diet low in saturated fats and cholesterol. Normalizing weight and increasing physical activity are also effective. For every 1 percent reduction in total cholesterol there is a 2 percent reduction in cardiovascular disease risk. (19)

The National Cholesterol Education Program has recommended that all adults have their cholesterol measured and begin treatment if the total cholesterol meets criteria set forth in the Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. (20) The *Healthy People 2000: Objectives for the Nation* recommend that, by the year 2000, 75 percent of adults will have had their cholesterol measured within the past five years. By 1992, 68 percent of New Yorkers reported their cholesterol had been measured within the past five years, which is slightly higher than the median value for the United States of 66 percent (Figure 5). The proportion of people getting a cholesterol measurement doubled since 1987. Population groups that were less likely to report having their cholesterol checked included males, younger age groups, those with lower educational status and income and nonwhites. Among those who have had their cholesterol checked, only one in four was able to report their cholesterol level.

In 1990 and 1992, the BRFSS included a special module to identify the relative fat intake of respondents, which used an abbreviated food frequency questionnaire (13 foods and food groups) to develop an index of fat intake. This survey found that one-quarter of adults consumed a diet high in fat. Reducing dietary fat intake can lead to lower levels of cholesterol in the blood. Males and those never married were more likely to be in the high fat intake group. A greater proportion of smokers were in the high fat intake group than non-smokers; people with both risk factors had an even higher cardiovascular risk. Because this module was only included twice during the period being studied, it is difficult to establish trends in dietary fat intake. The data for 1990 and 1992 indicate that a considerable proportion of the population is at increased risk for elevated blood cholesterol as a consequence of consuming a high fat diet.

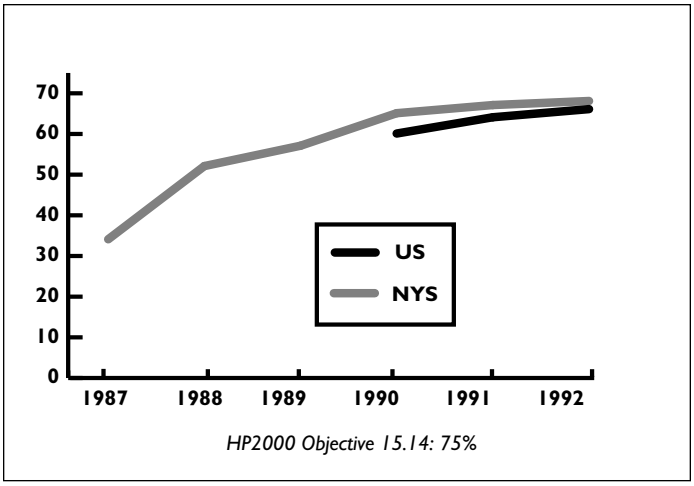

Figure 5. Percent of New York State Adults Having Their Cholesterol Checked in the Past Five Years, 1987-1992

Data from the Third National Health and Nutrition Examination Survey for the period 1988-1991 show that Americans over age two consumed 34 percent of their calories from fat, a decline from 36 percent in 1976-1980. (21) However, the average caloric consumption increased by 100-300 calories in different age/sex groups. This increase in total calories (despite the decrease in the percentages of calories from fat) may partially explain the greater prevalence of overweight over time.

High Blood Pressure

High blood pressure, or hypertension, significantly increases risk of ischemic heart disease, stroke, other complications of advanced atherosclerosis, as well as damage to the heart, brain, kidneys, eyes and other organs. (22) Approximately 30 percent of adults have high blood pressure, and of these hypertensive adults, 80 percent are not controlled (either because they are unaware of their condition, not on a therapeutic regimen or ineffectively treated). (23, 24) People with uncontrolled high blood pressure are at three to four times the risk of developing heart disease and as much as seven times the risk for stroke as those with normal blood pressure. The prevalence of high blood pressure is greater in blacks, in men and in older age groups.

The Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure recommends that physicians measure blood pressure at each patient visit. (25) Furthermore, there has been an extensive public health campaign to promote blood pressure screening of the general public. In 1992, the BRFSS found that 95 percent of respondents reported that they had their blood pressure measured in the past two years, the same as the United States median value. This proportion was similar across all demographic groups and suggests that nearly all New Yorkers are receiving regular blood pressure checks.

Discussion

Respondents were selected randomly from all New York State residents with telephones, using a probability sampling method. With about 93 percent of all households having telephones, telephone surveys are a cost-effective method for rapidly obtaining population-based data. However, there are limitations to telephone survey data which must be considered when interpreting survey results. (26) Certain groups are more likely to be excluded from or underrepresented in telephone survey samples, specifically those who live in households without telephones, those who are more difficult to contact because of the hours when they are not available at home and those who refuse to participate in telephone queries. The response rate to the Behavioral Risk Factor Survey is defined as the number of interviews completed among eligible individual units as a proportion of eligible units in the sample. New York's response rate averaged 75 percent over the eight-year period, which was slightly lower than the average of all participating states. Each of these factors may contribute to a sample that is not representative of the general population. Since the individuals participating in the Behavioral Risk Factor Survey are different from the underlying population, the survey data will give biased estimates for the New York State population.

Most of the data on risk behaviors and risk factors described here were self reported during a telephone interview (the survey of school children regarding overweight entailed actual measurements). Self-reported data may be affected by the ability of participants to respond honestly and accurately to survey questions. Research conducted in New York State has shown significant underreporting for hypertension and hypercholesterolemia, largely because a large proportion of respondents are unaware of their condition. (27) Similar underreporting exists for obesity and smoking, which some people may be unwilling to admit. These biases may result in a population profile that appears healthier than it is. Reliability (the probability that a respondent will give the same answer in a subsequent interview) is generally high (0.60 or greater) for questions related to all cardiovascular risk factors except those concerning dietary intake. (28) In general, these biases have a stronger effect on the interpretation of annual prevalence estimates than of trends, since the effects are likely to remain relatively constant over time.

Over the time period of this analysis, the wording for all questions except those related to physical activity remained constant. An exchange between CDC and researchers at the University of Minnesota noted that these changes might result in higher estimates for sedentary lifestyle over time, with Jacobs et al. arguing that the trend analysis should be restricted to the period beginning in 1987, during which the wording did not change. (29) Therefore, some caution is appropriate when interpreting the prevalence data for this risk factor.

The trends reported for the cardiovascular risk behaviors are very disappointing. After an encouraging decline from 1985 to 1987, the prevalence of smoking remained constant through 1992. Unfortunately, prevalence rates for overweight and sedentary lifestyle among New York State adults are rising, paralleling

national trends. These data confirm other surveys showing that nearly everyone has had their blood pressure checked within the past two years and that the proportion of adults having their cholesterol checked has risen significantly. Since these survey data do not provide estimates for the blood pressure and cholesterol levels in the population, we cannot determine trends in these risk factors. We hope that the high utilization of physician examinations to measure blood pressure and cholesterol levels has resulted in increased detection of people with elevated levels, and is accompanied by better treatment and control rates.

Trends in New York State's ischemic heart disease mortality underscore our concern about the cardiovascular health of the state's residents. The age-adjusted ischemic heart disease death rate *rose* in 1991, after declining during the 1980s (Figure 6). This rise was attributable to increased mortality in New York City residents, who comprise about 40 percent of the state's population.

The potential for a relationship between changes in the prevalence of the risk behaviors we have studied and these mortality trends is intriguing, but complex. The effects on mortality that may result from changes in risk behaviors may appear quickly (e.g., quitting smoking reduces risk almost immediately), but usually require much longer time periods. There is considerable variation between individuals in the time required before cardiovascular events are likely to occur. These variations make it very difficult to link trends in risk behaviors and mortality. Given the current trends, however, the *probability* of higher ischemic heart disease mortality in the future has risen.

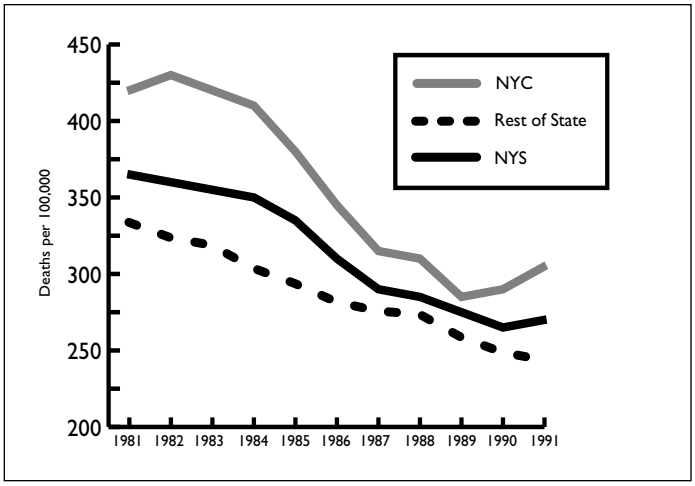

Figure 6. Age-Adjusted Death Rates for Ischemic Heart Disease

The risk factors described here can be addressed by a combination of community interventions and targeted approaches to modify the risk profile of individuals. The increases in overweight, sedentary lifestyle and youth smoking pose a significant challenge and concerted, comprehensive efforts will be required to reverse these trends. Because these risk factors are less amenable to clinical intervention, public health approaches to reduce these risks, particularly for high risk groups, must be given a high priority.

References

1. Sytkowski, PA, Kannel, WB and D'Agostino, RB. Changes in risk factors and the decline in mortality from cardiovascular disease: The Framingham Heart Study. *The New England Journal of Medicine* June 7, 1990; 322(3):1635-1641.
2. Kannel, WB. Meaning of the downward trend in cardiovascular mortality. *Journal of the American Medical Association* February 12, 1982; 247(6): 877-880.
3. Goldman, L and Cook, F. The decline in ischemic heart disease rate: an analysis of the comparative effects of medical interventions and changes in lifestyle. *Annals of Internal Medicine* 1984; 101: 825-836.
4. Vital Statistics of the United States: Part B, Mortality, 1979-1990.
5. McNutt L, Strogatz DS, Coles FB, Fehrs L. High Ischemic Heart Disease Mortality Rate in New York State—Is it Just an Urban Effect? Accepted for publication in *Public Health Reports*.
6. Sempos C, Cooper R, Kovar MG, McMillen M. Divergence of the recent trends in coronary mortality for the four major race-sex groups in the United States. *American Journal of Public Health* 1988; 78:204-209.
7. Cummings KM, Stiles J, Mahoney MC, Sciandra R. Health and economic impact of cigarette smoking in New York State, 1987-1989. *New York State Journal of Medicine* November 1992; 92(11):469-473.
8. Smoking and health: A report of the Surgeon General. DHEW Publ. No. (PHS) 79-50066. Chapter 4, 63.
9. U.S. Department of Health and Human Services. Preventing tobacco use among young people: A report of the Surgeon General. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 1994.
10. The 1991 New York State Youth Risk Behavior Survey Report. New York State Education Department, Bureau of School Health Education and Services. April 1992, 21-24.
11. Williamson DF. Descriptive epidemiology of body weight and weight change in U.S. adults. *Annals of Internal Medicine* 1993; 119(7 part 2):672-676.

12. Garn SM, Lavelle M. Two-decade follow-up of fatness in early childhood. *American Journal of Diseases in Children* 1985; 139: 181-185.

13. Dietz WH. Obesity in infants, children, and adolescents in the United States, I. Identification, natural history, and after effects. *Nutrition Research* 1981;1:117-137.

14. Wolfe WS, Campbell CC, Frongillo EA Haas JD, Melnik TA. Identifying overweight children in New York State: Prevalence estimates and related characteristics. Accepted for publication in the *American Journal of Public Health*.

15. Unpublished findings from the Division of Nutrition, New York State Department of Health.

16. Schechtman KB, Barzilai B, Rost K, et al. Measuring physical activity with a single question. *American Journal of Public Health* June 1991;81(6): 771-773.

17. Lamb KL and Brodie DA. The assessment of physical activity by leisure-time physical activity questionnaires. *Sports Medicine* 1990;10(3), 159-180.

18. Simons-Morton BG, Pate RR, Simons-Morton DG. The risks of exercise: a public health view of injuries and hazards. *Public Health Reports* 1985;100, 189-195.

19. Lipid Research Clinics program: The Lipid Research Clinics Coronary Primary Prevention Trial Results. *Journal of the American Medical Association* 1984; 251: 351-374.

20. The Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *Journal of the American Medical Association* June 6, 1993; 269 (23):3015-3023.

21. Dietary fat and total food-energy intakes. Third National Health and Nutrition Examination Survey, Phase 1. M*orbidity and Mortality Weekly Report* February 25, 1994.

22. Kannel WB and Stokes J III. Hypertension as a cardiovascular risk factor. In: Bulpitt CJ, ed. *Handbook of Hypertension*, Vol. 6: Epidemiology of Hypertension. New York, N.Y: Elsevier Science Publishers; 1985:15-34.

23. Definition and Prevalence Subcommittee. 1984 Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure. Hypertension prevalence and the status of awareness, treatment, and control in the United States: Final Report, *Hypertension* 1985; 7(3): 457-468.

24. Unpublished data collected during 1988-1991 and provided by the Centers for Disease Control, National Center for Health Statistics. Included in: The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. USDHHS, NIH Publ. No. 93-1088, January 1993, 1.

25. The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. USDHHS, NIH Publ. No. 93-1088, January 1993, 1-49.

26. Kolton G. Introduction to Survey Sampling. In: *Quantitative Applications in the Social Sciences*. Sage Publications, 86-88.

27. Bowlin SJ et al. Validity of cardiovascular disease risk factors assessed by telephone survey: the behavioral risk factor survey. *Journal of Clinical Epidemiology* 1993;46(6), 561-571.

28. Shea S et al. Reliability of the behavioral risk factor survey in a triethnic population. *American Journal of Epidemiology* 1991; 133,489-500.

29. Time Trends in Leisure-Time Physical Activity. Correspondence between Yeager KK, Macera CA, Eaker E, Merritt RK and Jacobs DR, Folsom AR, Hannan PJ, Sprafka JM, McGovern PG, Salem N. *Epidemiology*, July 1991, 2(4):313-316.